Assignment 0

1. Find the solutions of the quadratic equation:

   \[ 2x^2 - 5x + 3 = 0 \]

   Use the quadratic formula. (Solution: \( x = 1, x = 1.5 \))

2. Find all values of \( x \) for which the inequality holds:

   \[ 3x^2 - 4x + 1 > 0 \]

   (Solution: \( x > 1 \) or \( x < 0.5 \))

3. Find the solution of the exponential equation:

   \[ 2^x = 8 \]

   (Solution: \( x = 3 \))

4. Find the domain of the function:

   \[ f(x) = \frac{1}{x-1} \]

   (Solution: \( x \neq 1 \))

5. Evaluate the limit as \( x \) approaches 0 of the function:

   \[ \lim_{x \to 0} \frac{\sin(x)}{x} \]

   (Solution: 1)

6. Find the derivative of the function:

   \[ f(x) = x^3 - 2x^2 + 3x - 4 \]

   (Solution: \( f'(x) = 3x^2 - 4x + 3 \))

7. Evaluate the integral:

   \[ \int (2x + 3) \, dx \]

   (Solution: \( x^2 + 3x + C \))

8. Find the maximum and minimum values of the function:

   \[ f(x) = x^2 - 4x + 5 \]

   (Solution: Minimum at \( x = 2 \) with value \( f(2) = 1 \); maximum does not exist.)

9. Find the point of inflection of the function:

   \[ f(x) = x^3 - 3x^2 + 2x - 1 \]

   (Solution: \( x = 1 \))

10. Evaluate the definite integral:

    \[ \int_{0}^{1} (4x^2 - 2x + 1) \, dx \]

    (Solution: \( \frac{4}{3} \))

11. Evaluate the indefinite integral:

    \[ \int (3x^2 + 2x - 1) \, dx \]

    (Solution: \( x^3 + x^2 - x + C \))

12. Evaluate the limit:

    \[ \lim_{x \to 0} \frac{\sin(x)}{x} \]

    (Solution: 1)

13. Evaluate the limit:

    \[ \lim_{x \to \infty} \frac{3x^2 + 2x - 1}{4x^2 - 3x + 2} \]

    (Solution: \( \frac{3}{4} \))

14. Find the critical points of the function:

    \[ f(x) = x^3 - 3x^2 - 9x + 1 \]

    (Solution: Critical points at \( x = 0 \) and \( x = 3 \))

15. Find the area under the curve:

    \[ f(x) = x^2 - 4x + 5 \text{ from } x = 0 \text{ to } x = 2 \]

    (Solution: \( \frac{20}{3} \))

16. Find the volume of the solid of revolution obtained by revolving the region bounded by the curves:

    \[ y = x^2 \text{ and } y = 0 \text{ from } x = 0 \text{ to } x = 2 \]

    (Solution: \( \frac{32}{3} \pi \))

17. Find the area of the region bounded by the curves:

    \[ y = x^2 \text{ and } y = 4 \]

    (Solution: \( 12 \))

18. Find the area of the region bounded by the curves:

    \[ y = \sqrt{x} \text{ and } y = 0 \text{ from } x = 0 \text{ to } x = 4 \]

    (Solution: \( 8 \))

19. Find the area of the region bounded by the curves:

    \[ y = \frac{1}{x} \text{ and } y = 0 \text{ from } x = 1 \text{ to } x = 2 \]

    (Solution: \( \ln(2) \))

20. Evaluate the integral:

    \[ \int_{0}^{1} (4x^2 - 2x + 1) \, dx \]

    (Solution: \( \frac{4}{3} \))

21. Evaluate the integral:

    \[ \int (3x^2 + 2x - 1) \, dx \]

    (Solution: \( x^3 + x^2 - x + C \))

22. Evaluate the limit:

    \[ \lim_{x \to 0} \frac{\sin(x)}{x} \]

    (Solution: 1)

23. Evaluate the limit:

    \[ \lim_{x \to \infty} \frac{3x^2 + 2x - 1}{4x^2 - 3x + 2} \]

    (Solution: \( \frac{3}{4} \))

24. Find the critical points of the function:

    \[ f(x) = x^3 - 3x^2 - 9x + 1 \]

    (Solution: Critical points at \( x = 0 \) and \( x = 3 \))

25. Find the area under the curve:

    \[ f(x) = x^2 - 4x + 5 \text{ from } x = 0 \text{ to } x = 2 \]

    (Solution: \( \frac{20}{3} \))

26. Find the volume of the solid of revolution obtained by revolving the region bounded by the curves:

    \[ y = x^2 \text{ and } y = 0 \text{ from } x = 0 \text{ to } x = 2 \]

    (Solution: \( \frac{32}{3} \pi \))

27. Find the area of the region bounded by the curves:

    \[ y = x^2 \text{ and } y = 4 \]

    (Solution: \( 12 \))

28. Find the area of the region bounded by the curves:

    \[ y = \sqrt{x} \text{ and } y = 0 \text{ from } x = 0 \text{ to } x = 4 \]

    (Solution: \( 8 \))

29. Find the area of the region bounded by the curves:

    \[ y = \frac{1}{x} \text{ and } y = 0 \text{ from } x = 1 \text{ to } x = 2 \]

    (Solution: \( \ln(2) \))

30. Evaluate the integral:

    \[ \int_{0}^{1} (4x^2 - 2x + 1) \, dx \]

    (Solution: \( \frac{4}{3} \))

31. Evaluate the integral:

    \[ \int (3x^2 + 2x - 1) \, dx \]

    (Solution: \( x^3 + x^2 - x + C \))

32. Evaluate the limit:

    \[ \lim_{x \to 0} \frac{\sin(x)}{x} \]

    (Solution: 1)

33. Evaluate the limit:

    \[ \lim_{x \to \infty} \frac{3x^2 + 2x - 1}{4x^2 - 3x + 2} \]

    (Solution: \( \frac{3}{4} \))

34. Find the critical points of the function:

    \[ f(x) = x^3 - 3x^2 - 9x + 1 \]

    (Solution: Critical points at \( x = 0 \) and \( x = 3 \))

35. Find the area under the curve:

    \[ f(x) = x^2 - 4x + 5 \text{ from } x = 0 \text{ to } x = 2 \]

    (Solution: \( \frac{20}{3} \))

36. Find the volume of the solid of revolution obtained by revolving the region bounded by the curves:

    \[ y = x^2 \text{ and } y = 0 \text{ from } x = 0 \text{ to } x = 2 \]

    (Solution: \( \frac{32}{3} \pi \))

37. Find the area of the region bounded by the curves:

    \[ y = x^2 \text{ and } y = 4 \]

    (Solution: \( 12 \))

38. Find the area of the region bounded by the curves:

    \[ y = \sqrt{x} \text{ and } y = 0 \text{ from } x = 0 \text{ to } x = 4 \]

    (Solution: \( 8 \))

39. Find the area of the region bounded by the curves:

    \[ y = \frac{1}{x} \text{ and } y = 0 \text{ from } x = 1 \text{ to } x = 2 \]

    (Solution: \( \ln(2) \))

40. Evaluate the integral:

    \[ \int_{0}^{1} (4x^2 - 2x + 1) \, dx \]

    (Solution: \( \frac{4}{3} \))

41. Evaluate the integral:

    \[ \int (3x^2 + 2x - 1) \, dx \]

    (Solution: \( x^3 + x^2 - x + C \))